Learning Asset Technology Integration Support Tool Design Document

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May 11, 2010

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
11 MAY 2010		**00-00-2010 to 00-00-2010**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Learning Asset Technology Integration Support Tool Design Document	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **George Mason University,Fairfax,VA,22030-4444**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**52**	

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Executive Summary

The Defense Acquisition University (DAU) partnered with George Mason University (GMU) to identify research-driven processes and methods for incorporating Advanced Learning Technologies (ALT) in a pedagogically sound manner within DAU learning assets. A performance analysis, conducted in fall 2009, indicated a need for a framework that assists DAU personnel in the selection and integration of ALT. In collaboration with DAU stakeholders, this framework was named the **L**earning **A**sset **T**echnology **I**ntegration **S**upport **T**ool (LATIST).

A usage-centered design process was used to develop LATIST. This technique, commonly used in software development, focuses on identifying user needs to develop a product that allows the users to fulfill their needs in an easy, effective, and efficient way. As part of a content and task analysis, user needs were confirmed, tasks necessary for users to obtain optimal benefit while using LATIST were identified, and content requirements were established. LATIST would allow the user to: (1) explore what the research says about a technology such as advantages and disadvantages; (2) select a best technology for user conditions such as learning objectives and bandwidth constraints; and (3) review and learn how to apply a selected technology. Based on the results of the content and task analysis, it was determined that LATIST would be best utilized as an electronic performance support tool. A performance support subject matter expert recommended that for maximum effectiveness, information in LATIST should be explicit, accessible, and usable. The expert also confirmed that the three LATIST components represented a successful integration of process and knowledge.

A requirements document was developed to convey the necessary user and system information for an external software developer, Bean Creative, to develop the LATIST prototype. User requirements were derived from the content and task analysis, specifically the scenarios and use cases. System requirements focused on technical considerations such as using an open-source content management system with a back-end database to house and manage LATIST content. Flowcharts, navigation, site architecture, and wireframes were used to represent the team vision for LATIST layout and functionality to meet user needs. Since LATIST was intended to dynamically load information based on user needs, two logical data models were developed to support selecting a best technology and providing a searchable repository of the research related and how-to apply information. Based on the requirements document, an initial prototype was developed to begin usability testing. Additionally, two short videos were designed and developed by an external vendor, In-Brief Videos, to introduce users to LATIST.

Two rounds of usability testing were conducted using the LATIST prototype to iteratively improve the prototype based on expert and user community feedback. Both rounds were intended to determine design inconsistencies and usability problems to establish user performance and user satisfaction levels. Both rounds consisted of two phases; Phase I relied on

the immersion team and proxy participant feedback while Phase II relied on end user participant feedback. Round 1 focused on comparing the design requirements to the prototype as well as receiving initial user reaction to the prototype as captured by an asynchronous online survey. Based on this feedback, additional changes were made to this initial prototype to begin Round 2 usability testing. In this round, Phase I was again used to compare the requirements and requested changes to the updated prototype. In Phase II, each GMU Immersion team member facilitated a structured one-on-one evaluation of LATIST with a DAU faulty or staff member using a semi-prescriptive instrument following a think-aloud protocol. These results were tabulated for (a) time to complete the task-based scenarios, (b) the completion rate for each question per scenario, (c) the rate of error for each question, and (d) attitudinal measures derived from an open-ended question as well as comments noted during the evaluation. Based on these results, changes were recommended for the final prototype development and for future enhancements.

This design document provides a detailed view of the instructional design principles and processes that the GMU Immersion team undertook to design LATIST and develop a representative prototype (see Figure 1). It outlines the problem statement and the team's proposed solution, followed by summaries of the content and task analyses, the design requirements, and the usability testing methodology and results. This design document concludes with recommendations for further development of LATIST. The LATIST prototype can be accessed at: http://cehd.gmu.edu/latist

Figure 1. Home Page of LATIST prototype

Introduction

In 2009, Defense Acquisition University (DAU) partnered with the Instructional Technology Immersion Program of George Mason University (GMU) to conduct comprehensive research on Advanced Learning Technologies (ALT) to enhance its learning assets. According to the original GMU-DAU/RDECOM proposal and statement of work, the scope of the project was to conduct comprehensive research on two broad categories of ALT: game and simulation based and social media enabled learning. Based on the GMU Immersion team's performance analysis and synthesis of research, examination of learning assets and organizational structure, and discussions with DAU stakeholders, the scope of the project was narrowed to the following:

> In order to assist DAU in enhancing the effectiveness and efficiency of their learning assets, the GMU Immersion team will identify processes and research-based methods for incorporating pedagogically sound ALT design and delivery tools within DAU learning modalities.

The initial proposal called for a research-driven approach known as the Integrative Learning Design Framework (ILDF). The ILDF is an instructional design model which provides a systematic framework for the development of learning assets based on sound pedagogy, socio-cultural context, and iterative evaluation (Dabbagh & Bannan-Ritland, 2005). The ILDF is a comprehensive and flexible model that draws heavily from the iterative nature of traditional systematic processes of instructional design and can be applied in multiple design and development settings (see Figure 2).

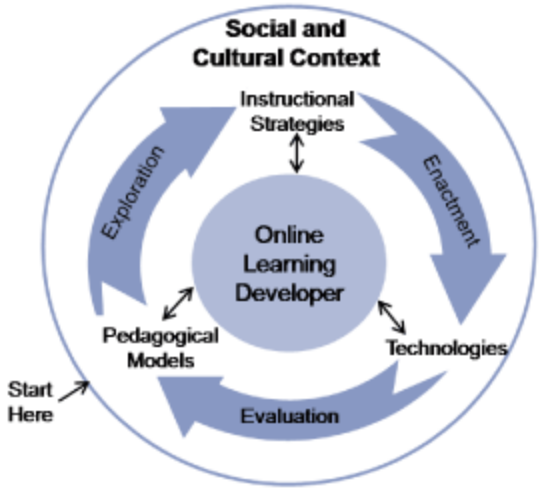

Figure 2. Integrative Learning Design Framework (ILDF)

In the fall semester, the GMU Immersion team entered the Exploration phase of this model and conducted a thorough performance analysis which included a Front End Analysis

(FEA), a Briefing Report (BR), and a Needs Assessment (NA). Through this analysis, which included a comprehensive review of DAU learning assets, a series of meetings and interviews with DAU faculty and staff, and a survey about DAU learning assets and course design and development processes, the GMU Immersion team proposed an online support tool solution to aid DAU in making decisions regarding technologies to integrate into their courses while providing research and tutorials on pedagogically sound use of such technologies. In the spring semester, the team focused on the Enactment and Evaluation phases of the ILDF in order to design and develop this online support tool proposed as a result of the performance analysis.

This design document describes the processes related to the Enactment and Evaluation phases of the ILDF undertaken by the GMU Immersion team in the spring semester and includes problem identification and proposed solution summary, content and task analysis summary, an overview of user requirements, and a summary of usability tests and results. The document concludes with recommendations for further development of the prototype.

Problem Identification and Proposed Solution

The goal of this project was to identify processes and research-based methods for incorporating pedagogically sound ALT within DAU‘s learning modalities. The results from the performance analysis conducted in fall 2009 indicated a need for a framework to assist DAU personnel in the selection and integration of ALT. DAU personnel include Center Directors, Performance Learning Directors, Course Managers, and Global Learning Technology Center Personnel which include Instructional Systems Designers, Knowledge Project Officers, and Technology Experts. The results also indicated that such a framework should focus on user needs rather than on specified target audience roles. Based on the results of this performance analysis, the GMU Immersion team proposed the following macro-level recommendation:

- To develop a research-based framework which will assist DAU with the integration of ALT within DAU’s learning modalities.

At the micro-level, this framework was conceptualized to have three components designed to meet the specific needs of all users, regardless of their role in the ALT integration process.

- *Explore Research:* This component presents research on previously defined ALT of social media, virtual worlds/games and simulations, and mobile technologies and will include pedagogically appropriate usage, best practices, and recommendations resulting in a series of white papers.

- *Select Best Technology:* This component presents ALT research findings as contextualized to DAU needs with particular focus on factors identified through interview and survey responses and on course levels and identified learning objectives.

Findings will be presented in a way to facilitate ALT integration decision-making by DAU stakeholders.

- *Apply Technology:* This component examines specific learning assets selected in collaboration with DAU stakeholders and showcases potential uses of ALT, including information and training on how and why particular technologies were chosen and integrated.

In collaboration with DAU stakeholders, this macro-micro level research-based framework was named the **L**earning **A**sset **T**echnology **I**ntegration **S**upport **T**ool (LATIST). LATIST was conceptualized and designed as an Electronic Performance Support System (EPSS), which is defined as "an integrated electronic environment that is available to and easily accessible by each employee and is structured to provide immediate, individualized on-line access to the full range of information, software, guidance, advice and assistance, data, images, tools, and assessment and monitoring systems to permit job performance with minimal support and intervention by others" (Dickelman, 2004). An EPSS differs from traditional instructional training products in that they supply to the employee just-in-time support to facilitate task completion. LATIST was designed to assist DAU faculty and staff in making informed decisions about ALT and to help them find research and resources to assist them in integrating technology into their assets.

The goals of LATIST are to facilitate decision making among DAU faculty and staff by providing (a) a pedagogically driven decision support tool, (b) a repository of research on technology use in government, business, and education, and (c) access to information on how to integrate technology within learning assets. LATIST is also designed as a method to raise awareness of technology options and provide a tool for DAU faculty and staff to refer to when making technology decisions. As research and resources on ALT are constantly growing and evolving, LATIST is designed to be scalable by the client and encourages user interaction by embedding capabilities such as tagging, saving, sharing, and uploading within the tool.

In spring 2010, the GMU Immersion team separated into three subgroups which were tasked with managing the design and development of each subsection of LATIST. Each sub-group conducted content and task analyses for their component, assisted in the design and development of the LATIST prototype, and participated in usability testing of the tool. The remainder of this paper documents these processes.

Usage-Centered Design

This section summarizes how the GMU Immersion team used recommendations made from the Needs Assessment (NA) to proceed with LATIST design and development by employing a usage-centered design process. Usage-centered design is a model-based content/task analysis methodology comprised of role modeling, task modeling, and content modeling. Successful implementation of the usage-centered design process results in a product that allows users to fulfill their needs in easy, effective, and efficient ways (Constantine & Lockwood, 1999).

The usage-centered design process employs role, task, and content modeling techniques (see Table 1). The models and the techniques used to develop them are described below.

Usage Centered Design Process

Models	Techniques
Role Modeling	Scenarios Use cases
Task Modeling	Task analysis methods - Task knowledge analysis - Information processing analysis
Content Modeling	Taxonomies - Jonassen & Tessmer - Merrill

Table 1. Usage-centered design process

Role Modeling

The purpose of role modeling was to determine what users want to do within a system. To understand what DAU faculty and staff might want to accomplish with the proposed framework, several scenarios, or narrative descriptions of user roles, motivations, expectations, and actions, were developed. Then the scenarios were condensed into an inventory of interactions called use cases. Use cases consider the conditions and purposes under which a user will interact with the system. They illustrate possible user actions and corresponding system responses (Constantine & Lockwood, 1999). The use cases from several different scenarios were

combined into an essential use case. Essential use cases identified user needs and the system responses necessary to meet those needs.

After analyzing role model scenarios and use cases, the GMU Immersion team concluded that user needs would be met if they could search for, save, and print information about technology, choose a technology (taking into account course learning objectives and other factors), and apply or practice implementing a technology of choice.

A representative scenario and accompanying use case documenting one role model is provided in Appendix A.

Task Modeling

The second technique in usage-centered design, task modeling, included two parts. With common user needs identified from role modeling, task analysis methods were chosen. Task analysis provided a way to further describe and collect the tasks users will accomplish within LATIST. Thus, task modeling combines essential use cases and task analysis to determine what users need to know and do and how to apply knowledge to accomplish their goals (Jonassen, Tessmer & Hannum, 1999).

There are many task analysis methodologies, and due to the new and varied nature of LATIST, two methods were utilized: the Task Knowledge Structure (TKS) method and the Information Processing Analysis (IPA) method. TKS is an activity-based task analysis method focusing on how the interaction of human activity occurs within an environmental context. TKS is also a goal-oriented method that draws on essential use cases to analyze tasks that will help achieve the specific user's purposes identified during role modeling. The goals identified during a TKS task analysis may be performed simultaneously. For example, in LATIST, users can easily navigate from a certain technology in the Explore Research component directly to that same technology in the Apply Technology component. Access to Select Best Technology is available from any other part of LATIST. Analysis of simultaneous goal completion led to the conceptual notion that the interface could provide users with horizontal access to information rather than in a pre-determined hierarchical sequence. The TKS method highlighted elements that were critical to LATIST design: the relationship among users, tasks, and the user interface (Markopoulos, Pycock, Wilson, & Johnson, 1992).

IPA is the other task analysis methodology utilized for task modeling. The goal in this method is to create an idealized model. Taking into account course learning objectives and other factors identified through user role modeling and from surveys and interviews with DAU faculty and staff, this task analysis method allowed the design team to integrate the key elements DAU uses to make decisions regarding learning asset creation. The IPA method analyzes how individuals perform tasks and how they evaluate multiple factors to make decisions. The idealized decision-making process of the tool serves as a model for DAU faculty and staff to

recognize the relationship between pedagogy and appropriate integration of ALT within learning assets.

Through task modeling, tasks necessary to meet previously identified user needs such as search for information, choose a technology, and apply the technology were developed. From these tasks, objectives that users of the framework will be able to accomplish were defined. Objectives of the LATIST system are outlined in the requirements section of this document.

Content Modeling

The third technique of usage-centered design, content modeling, was completed by identifying and using taxonomies of learning outcomes. Taxonomies provide a way to classify tasks and align them with appropriate content, instructional strategies, and evaluations (Jonassen, Tessmer, & Hannum, 1999). Content for LATIST was developed based on what users need in order to meet desired outcomes identified during task modeling. The GMU Immersion team utilized two taxonomies to align user needs, tasks, and outcomes with LATIST content: the Jonassen and Tessmer taxonomy and Merrill's component display theory taxonomy.

The Jonassen and Tessmer taxonomy is a classification tool that takes into account not only traditional behavioral outcomes, but also cognitive, metacognitive, and motivational outcomes. One of the user needs identified in role modeling was that users would gain knowledge about a variety of technologies. The Jonassen and Tessmer taxonomy is not directed at a specific solution, but focuses on extending a user's knowledge, which aligns with the purpose of LATIST. Metacognitive outcomes are addressed as DAU faculty and staff make choices and as users make inferences based upon factors not explicit in the tool, such as personal experience. Jonassen and Tessmer recognize that multiple outcomes are possible and that multiple measures may be used to assess those outcomes. *This acceptance of multiplicity allows the designer to consider multiple entry points, multiple user needs, and multiple exit points, all of which are incorporated in LATIST.* Technological innovation is specifically noted in this taxonomy, which makes it a particularly suitable choice for the technology-driven content and delivery model of LATIST. User motivation is an important outcome because positive response by DAU faculty and staff to the benefits of LATIST is critical for its long-term use as a performance support tool.

Merrill's taxonomy is based on component display theory where tasks and content are each considered separately (Jonassen, Tessmer, & Hannum, 1999). This taxonomy allowed the GMU Immersion team to examine user tasks and content desired by the user as well as tasks and content required of LATIST itself. Essential use cases developed in role modeling identified user needs and the system responses necessary to meet those needs. The Merrill taxonomy provided further alignment of user and system needs with LATIST content. Adoption of this taxonomy allowed the team to conceptualize proposed content for the tool as individual learning

components. Merrill defined tasks such as identify, interpret, and execute, which are especially well suited to the types of tasks and content conceived for LATIST.

Based on content and task analysis, the GMU Immersion team determined that LATIST would be best utilized as a performance support and decision making tool. This led to a consultation with Gary Dickelman, a performance support expert who advised that for maximum effectiveness, information in LATIST should be explicit, accessible, and usable. He confirmed that the components, tasks, and content available in LATIST, as shown in Table 2, represented successful integration of process and knowledge that should prove valuable to DAU faculty and staff.

LATIST Component	**Techniques**
Explore Research	Examine technology advantages, disadvantages and best practices Explore what the research says about learning technologies
Select Best Technology	Select instructional strategies and learning technologies based on objectives Select appropriate technologies for DAU specific factors
Apply Technology	View real world examples of technology used in government and other settings Access technologies to practice for DAU learning assets

Table 2. Tasks and content in LATIST components

By the end of the usage-centered design process, the GMU Immersion team confirmed user needs, identified tasks necessary for users to obtain optimal benefit while using LATIST, and established content requirements.

LATIST Prototype Development

Based on the results of the content and task analysis, several learning objectives were defined for LATIST to guide the design and development process. Based on these objectives and the content and task analysis results, subtasks associated with each LATIST component were identified. Design requirements were developed based on the component subtasks, the user needs, content, and technical system requirements. The design requirements include visual representations of the desired navigation and functionality. Since some LATIST content is dynamically loaded based on user input, a backend database is required to support certain features. The logical data element relationships are provided for the databases.

LATIST Objectives and Tasks

LATIST is an online performance support tool intended for DAU faculty and staff. The content and task analysis which relied on scenarios and use case histories identified the subtasks associated with each main LATIST task (explore, select, and apply) as well as system response requirements. These subtasks were categorized to identify the type of performance support and training necessary to meet the user needs and system responses. These tasks served as the basis for the development of several learning objectives. The users of LATIST will be able to:

- explore and interpret what the research says about learning technologies
- compare advantages and disadvantages of using technologies in teaching and learning contexts
- examine best practices of technology use in a variety of teaching and learning contexts
- select the appropriate instructional strategy and learning technology given a specific learning outcome
- select the appropriate technology for a learning asset given a specific factor or a group of factors
- learn how technologies are implemented in educational contexts
- see real world examples of educational technology used in government, corporations, and higher education
- practice creating technologies to use in your learning assets

The following summarizes the objective of each LATIST component:

Explore Research

The Explore Research component of LATIST is a research-based body of knowledge on the subject of ALT. Specifically, three broad categories of ALT are addressed in the Explore Research component of LATIST: (1) Social Media, (2) Virtual Worlds / Games and Simulations, and (3) Mobile Technologies. DAU users will enter the Explore Research component to access research-based information related to these three ALT categories. One user may be satisfied with a brief summary such as reviewing an overview, advantages, disadvantages, and best practices of a specific ALT or a category of ALT. Another user might want to pursue more in-depth research by reviewing the available literature of that technology perhaps focusing on articles that have been highly rated by their peers. Users will be able to easily and intuitively move within different sections or views of the Explore Research component and between the Explore Research, Select Best Technology, and Apply Technology components of LATIST. While in the Explore

Research component, DAU faculty and staff will be able to print, share, add, upload, mark their favorites, and rate resources. It is envisioned that in the future, the system will provide "Amazon-type" recommendations for other resources for the user to review based on tagging or other such classification type metadata.

Select Best Technology

The Select Best Technology component of LATIST guides the users to make informed decision about which technologies to integrate into learning assets. This component is comprised of two subcomponents: the Decision Aide and the Factors Grid. Through the Decision Aide, users select a learning objective level that matches the learning objective for an identified DAU course or learning asset. The Decision Aide will respond by providing a list of potential instructional strategies for this learning objective. The user is then prompted to select an instructional strategy from the list. The system will then return a "best technology" to the user that will enhance learning for that specific learning objective. The Factors Grid will allow the user to evaluate technologies based upon criteria specific to DAU such as bandwidth, information stability, development cost, maintenance cost and speed to market. By utilizing both the Decision Aide and Factors Grid, users can evaluate technologies in a pedagogically sound manner while taking DAU specific criteria into consideration.

Apply Technology

The Apply Technology component of LATIST allows the user to interact with several technologies via tutorials prior to the integration of these technologies into DAU's learning environment. The Apply Technology component specifically provides the user with the opportunity to learn how to apply a specific technology by providing options to learn how to implement it; view real world examples of use in a DAU context and other business, military, and educational contexts; and gain hands-on practice. The user can access the information through a combination of embedded or hyperlinked videos, text documents, or URLs to external websites. The information provided in the Apply Technology component will allow the user to incorporate a selected technology suitable for a learning asset.

In addition to the features associated with each of the three components, LATIST provides many global features. Users will be able to quickly access the Explore Research and Apply Technology content based on a selected technology. The users will also be able to log in to add personal features such as rating articles, uploading content, and taking personal notes. An advanced search function is included to locate all resources based on filtering agents such as date, title, keyword, and author. A dictionary is intended to provide quick reference on what a technology is as well as defines the implementation factors significant to DAU. A Help feature targets technical issues related to system features such as uploading documents to LATIST.

The objectives for each of the main components for LATIST as well as global features were then further explained and detailed as design requirements for a developer. The following sections summarize the design factors associated with LATIST.

Design Requirements

The design requirements for LATIST are described from both a system and user perspective. From a system perspective, the design requirements focused on hardware and software capabilities in order to provide a tool that supports the desired objectives, navigation, and layout. LATIST was to support access in an anytime, anyplace environment, including mobile. LATIST was therefore to be browser-based, quickly accessible from the internet. From a macro-perspective, LATIST provides access to content based on a user's need. As such LATIST needed to be built within a Content Management System (CMS). Given the dynamic nature of some LATIST content, a backend database was necessary to manage some of the content. The design requirements from a user perspective were derived specifically from the content / task analysis. The results from the use cases delineated certain features that would support the user community. These included the capability to print, save, search, and share content; create a personal space of notes and personally rated content; upload content; navigate across components based on a selected technology; and access support features such as Help and Dictionary.

Based on these requirements and discussions with DAU stakeholders and information technology specialists, the core framework for the LATIST prototype is developed in WordPress, an open- source blog publishing application or CMS powered by an open-source server-side scripting language known as Hypertext Preprocessor (PHP) and by MySQL – a relational database management system that can also be used for content management. It has many features including a plug-in architecture and a variety of supporting, function-oriented templates. The LATIST design template was created using DAU's branding guidelines which were used throughout the prototype to maintain a consistent look and feel. The complete design requirements are provided in Appendix B. The user requirements and flowchart for each LATIST component, Explore Research, Select Best Technology, and Apply Technology, are located in Appendix C, D, and E, respectively.

LATIST Navigation and Site Architecture

LATIST navigation is designed to address these focal use cases:

- a user who is not familiar with what technology can do in a teaching and learning context and wants to learn about technology (Explore Research component)
- a user who has a known learning outcome and wants to see what technologies might be beneficial for that instance (Select Best Technology component)

- a user who wants to see how to apply a technology and practice those steps (Apply Technology component)

- a user has been directed to use a particular technology and wants to learn all about what the research says about the technology and how to apply it (Technology quick links)

As such, the primary navigation indicated in Figure 3 below will support a use case approach, that is, Explore Research, Select Best Technology, and Apply Technology. Additionally, the navigation will support the ability to immediately drill down to all LATIST resources related to a particular technology using the Technology quick links option. In this case, the technologies will be presented in alphabetical order. However, in the Explore Research and the Apply Technology, the available technologies are categorized as Social Media, Mobile Technology, or Virtual Worlds / Games and Simulations. This presentation by categories is intended to help the user understand the differences in the technologies.

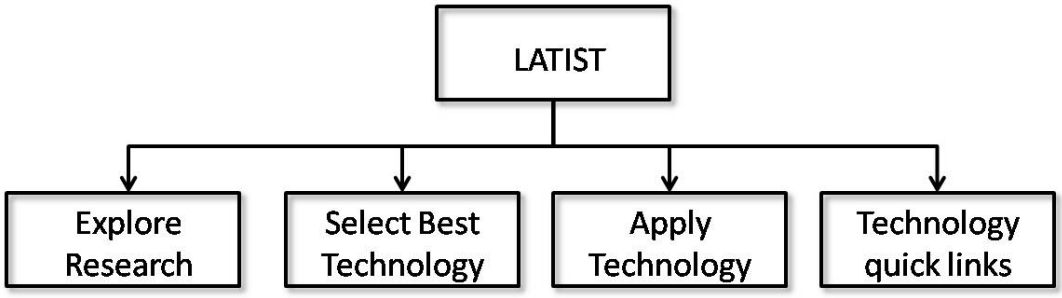

Figure 3. LATIST Global Flowchart

Since LATIST is a performance support tool housed in a CMS and not a standard website following a navigation priority, it will have an initial page from which the user can choose to enter the Explore Research, Select Best Technology, or Apply Technology components. Additionally, from the LATIST home page, users will have the ability to select a technology and receive a list of all information pages from the Explore Research and Apply Technology components for the selected technology (Technology quick links). The following outlines the site content for LATIST. The specific content in the outline should remain scalable as new technologies will be added as they emerge.

LATIST Home Page

- Login
  - Access features: mark as favorite, upload content, take notes into personal space

- About this project

- Help
- Dictionary
- Technologies quick links
  - Quick access to Explore Research and Apply Technology content for a selected technology
- Explore Research Home
  - Select technology for Overview, Advantages, Disadvantages, Best Practices, Literature
- Select Best Technology Home
  - Decision Aide
    View generated report
  - Factors Grid
    View generated report
- Apply Technology Home
  - Select technology for tutorial and practice

LATIST Wireframes

A global wireframe for LATIST was developed based on the desired content while remaining cognizant that LATIST is a performance support tool and not just a website. The global wireframe, as seen from the LATIST home page, provides the developer with a graphical representation of the current vision for supporting the LATIST flowchart and content. The initial LATIST homepage wireframe depicted in Figure 4 and the final wireframe in Figure 5 does not necessarily reflect the best design for the user and is open to any changes or recommendations provided by the developer. Based on the system and user requirements, wireframes were developed for the Explore Research home page (Figure 6), Select Best Technology home page (Figure 7), Apply Technology home page (Figure 8), and the Technology quick links functionality (Figure 9). Additionally, wireframes were developed for the user login (Figure 10) and the Advanced Search (Figures 11 and 12) to reflect the envisioned functionality and capability associated with each of these features.

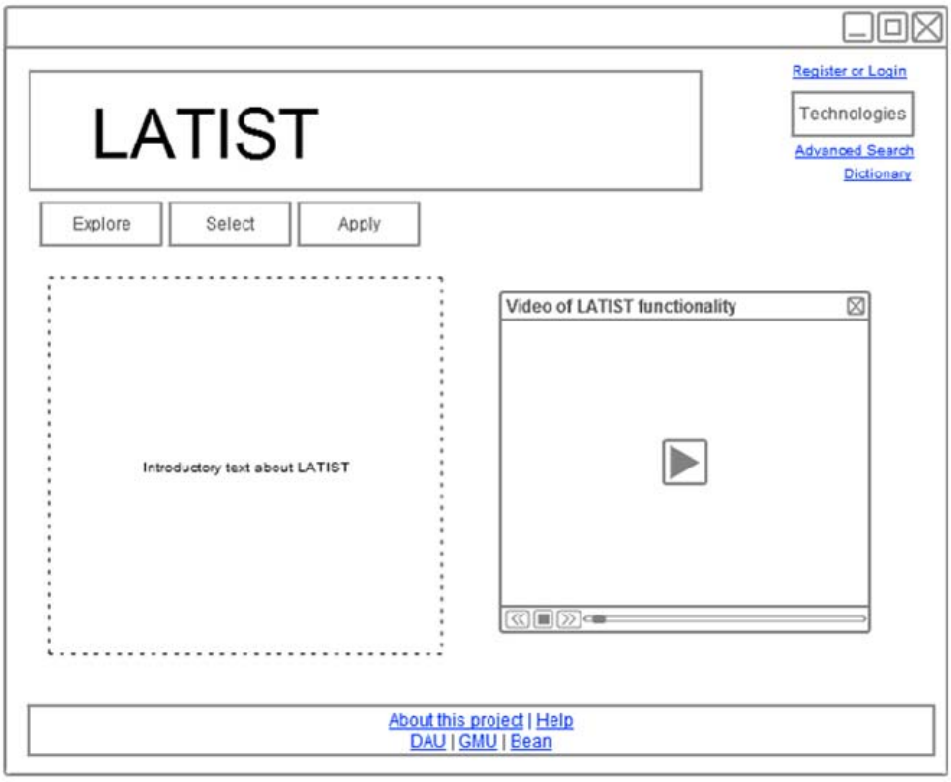

Figure 4. LATIST Home Page – initial wireframe

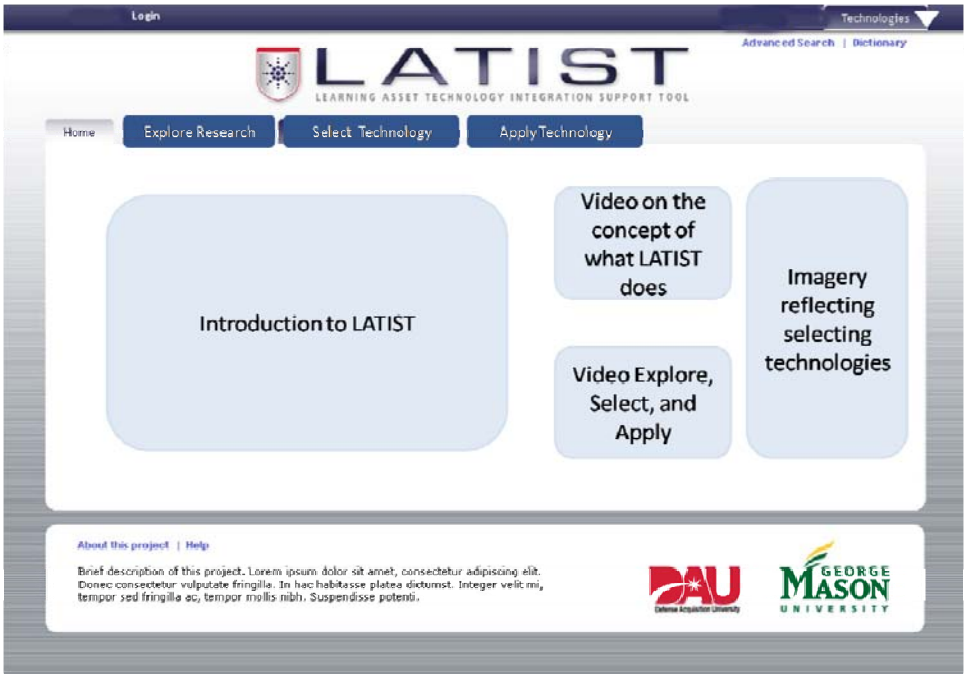

Figure 5. LATIST Home Page – final wireframe

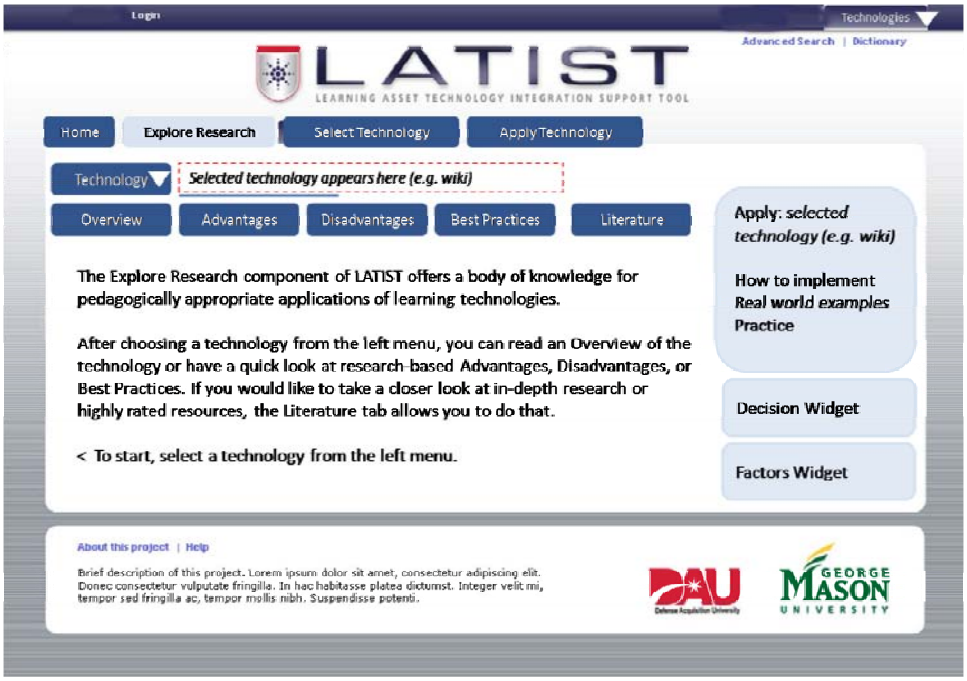

Figure 6. Explore Research Home Page

Figure 7. Select Best Technology Home Page

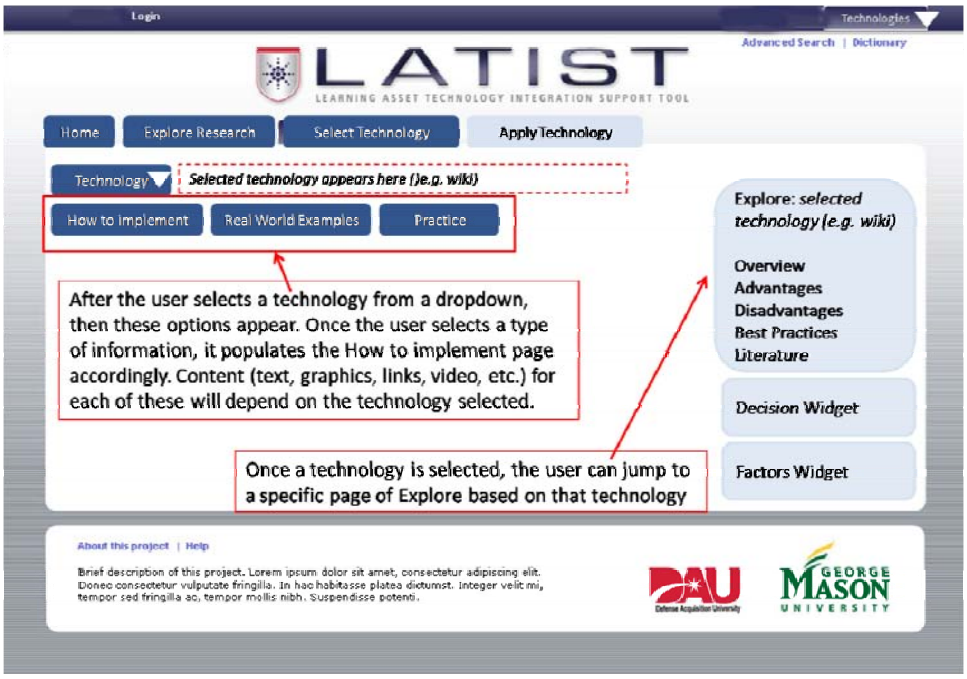

Figure 8. Apply Technology Home Page

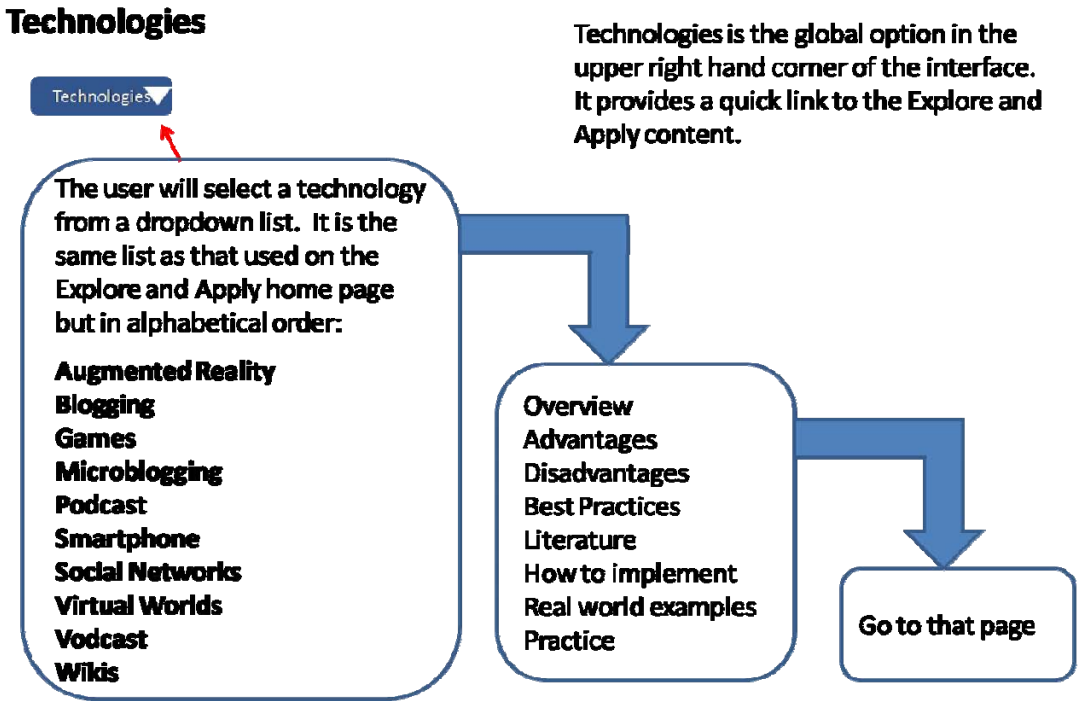

Figure 9. Technology Quick Links

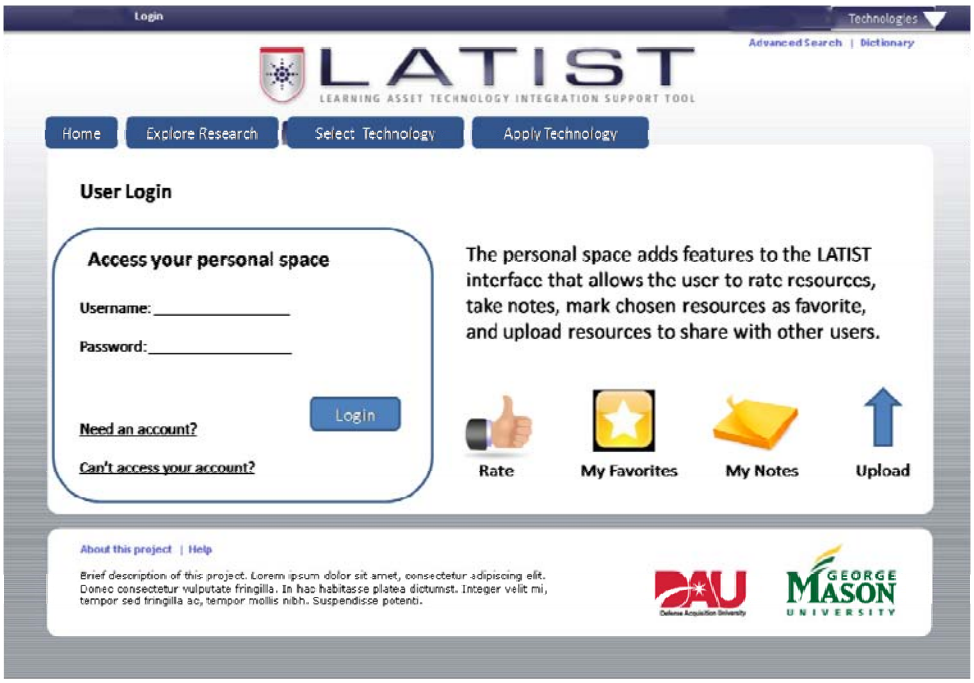

Figure 10. User Login

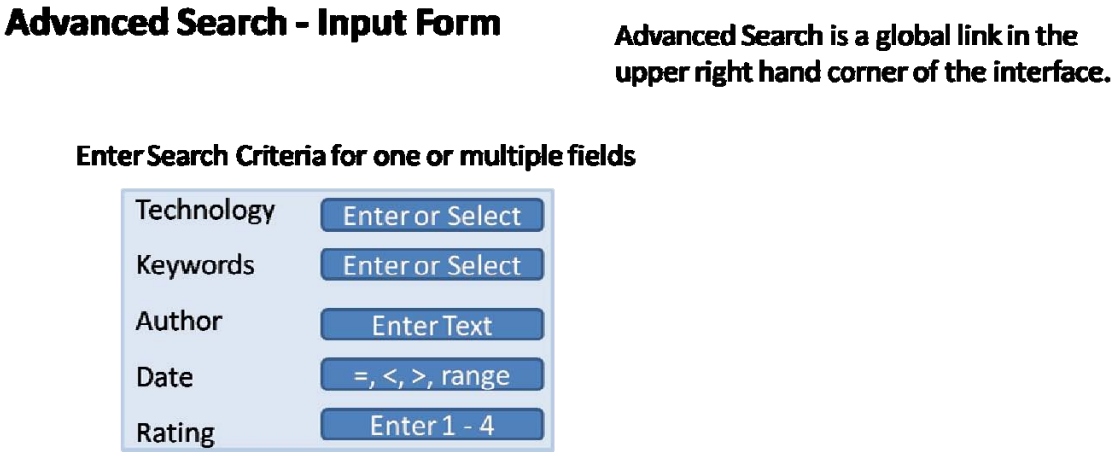

Figure 11. Advanced Search Input Form

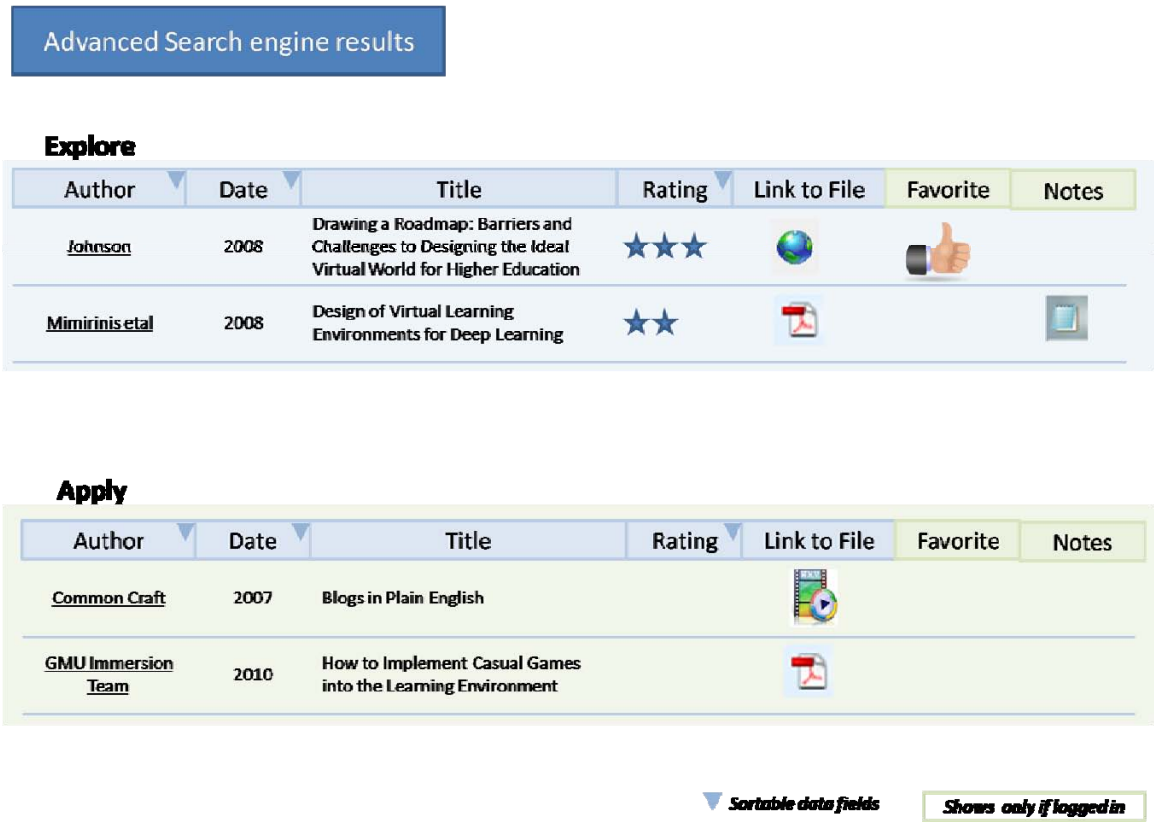

Figure 12. Advanced Search Results

Logical Data Model

LATIST will require a backend database to maintain data element relationships. The Select Best Technology will use a database to support the dynamic selection of a technology based on learning objective or other DAU specific factors. The Explore Research and Apply Technology components will share a database to categorize and track all resources associated with these components such as videos and research papers. The Explore Research and Apply Technology database will support features such as the Advanced Search and resource rating. The following provides the information to support development of these databases. The database relationships are not indicative of navigation.

Select Best Technology Component

The Select Best Technology component of LATIST is used to assist DAU in making decisions when implementing technology into their learning assets. The Select Best Technology component consists of two subcomponents: the Decision Aide and the Factors Grid. The Decision Aide starts with the user identifying the level of their learning objective based on Bloom's taxonomy. The Decision Aide generates instructional strategies from which the user selects one that interests them. Based on these sequenced selections, the Decision Aide generates

a list of recommended technologies to consider as well as a description on how that technology can support the corresponding instructional strategy (see Appendix B).

Factors Grid: Data Matrix

As part of the performance analysis conducted last semester, DAU identified and rank ordered 20 factors that influence the selection, usage, and integration of technology into their learning assets. Based on later discussions with DAU stakeholders, five factors were considered paramount and should be used in the LATIST prototype. DAU stakeholders provided the bounding parameters associated with each factor. The GMU Immersion team assigned a technology to each parameter for each factor.

Factors	Parameters	Technology
Content Stability	Daily-Monthly	All Social Media
	Monthly-Annually	Virtual Worlds
	Yearly-Never	Games/Augmented Reality
Bandwidth/Connectivity	High	Virtual Worlds/Games
	Low	All Social Media
	Intermittent Bandwidth	Mobile Technology
Development Cost	Low Budget (>25K)	All Social Media
	Mid Budget (25K-100K)	Games, Virtual Worlds
	High Budget (100K+)	Augmented Reality
Maintenance Cost	Low Budget (>10K)	All Social Media
	Mid Budget (10K-100K)	Games/Virtual Worlds
	High Budget (100K+)	Augmented Reality
Speed to Market	ASAP	All Social Media
	1-6 Months	Virtual Worlds
	Over 6 Months	Games/Augmented Reality

Entity Relationships: Factors Grid

- Every factor must relate to every technology types.
- Every technology must relate to every factor.

Considerations

- Each of the factors will need a field for a description.

- Each of these parameters and factor categories will need to be updatable (the technologies in the development and maintenance cost categories are placeholders)

Explore Research and Apply Technology Component

The purpose of the LATIST Explore Research and Apply Technology component database is to organize resources so they are searchable and can be personalized, such as by marking as a favorite. Each user will be able to personalize each resource by annotating it as their favorite, rating it, and adding notes associated with each resource (separate from the resource). The user will also be able to take notes not associated with a particular resource. The types of resources could be word documents, pdf, html, video, or audio files. Each resource is associated with a technology class and a technology. Technology classes are: social media, mobile technology, virtual worlds/games and simulations. Technologies will be: social networks, wikis, microblogging, blogging, podcast, vodcast, smartphone, augmented reality, games, and virtual worlds. Each resource will be identified by several attributes as indicated in the table below. Some resources will not have all database elements populated, such as an internally developed podcast may not have an author or date but will have a title, keywords, rating, file name, file type.

Technology Class	Technology	Resources per Technology	Attributes per each Resource
Social Media	Social networks	Advantages Table Disadvantages Table Best Practices Table → Research Papers More…	Resource # Author Date URL (see table below)
	Wikis		
	Microblogging Blogging		
Mobile Technology	Podcast		
	Vodcast		
	Smartphone		
Virtual Worlds/Games and Simulations	Augmented reality		
	Games		
	Virtual Worlds		

Resource Attributes. Each resource may contain the following data:

- Technology Categories: Social Media, Mobile Technology, Virtual Worlds/Games and Simulations
- Technology: social networks, wikis, microblogging, blogging, podcast, vodcast, smartphone, augmented reality, games, virtual worlds
- Author: Last name of first author, if more than one author, add et al (e.g. Mimirinis et al.)
- Date: YYYY (e.g. 2008)
- Title: complete title
- Keywords: or tags: are open entries, such as Twitter, case history, military, etc
- Citation: full APA style citation
- Rating: numeric 1 – 4, average of all users
- URL: link to documents external to LATIST (opens in a new window)
- File name: of those media files housed internal to LATIST (audio, video, documents, etc)
- File type: indicates to user what file type they are accessing (note LIB: links DAU library)
- Date Uploaded: date when the resource was uploaded to LATIST (DDMMMYY: 03Mar10)

Resource type. The type of information (book, journal, research, white paper, etc)

Resource Attributes		
	Resource A (example)	Resource B (example)
Resource #	1	49
Technology Category	Social Media	Mobile Technology
Technology	Wiki	Podcast
Author	Jones, M.J.	Turner, J.
Date	2010	1999
Title	How to Create a Wiki	Podcasting in e-learning
Keyword	demonstrate	Blackboard LMS
Citation	Jones, M.J. (2010, February 20). *How to create a wiki.* Retrieved March 4, 2010, from Mary Jane's website: http://www.maryjane.com/wiki	Turner, J. (1999). *Podcasting in e-learning.* New York, NY: Pocket Books.
Rating	3	4
URL	http://www.maryjane.com/wiki	null*
File name	null	Null
File Type	html	Null
Date Uploaded	04Mar10	Null
Resource Type	website	book

*null in this table implies an empty field

Personal Attributes. For each resource, a user has the option to identify:

- Favorite: user marks a resource as a personal favorite
- Rate: user rates the resource as 1 – 4 which is tallied into the overall rating of the resource
- Notes: user can make notes associated with a resource
- RSS: subscribe and receive RSS feeds (LATIST will have one)

	Personal Attributes			
Resource #	Favorite	Rate	RSS	Notes
1				
2				
null				

*null in this table means personal attributes (RSS and some notes) are not associated with any resource

Future development would support an Amazon-style recommended reading based tracking the resource selection of all users to produce the recommended reading. Recommended reading might say something similar to: 'others who have reviewed this, have also reviewed this…' Future development would also include an RSS that notifies users to resources uploaded to LATIST.

Evaluation Method and Results

Two rounds of usability testing were conducted using the LATIST prototype to iteratively improve the prototype based on expert and user community feedback. Both rounds were intended to determine design inconsistencies and usability problems to establish user performance and user satisfaction levels. Both rounds consisted of two phases; Phase I relied on the immersion team and proxy participant feedback while Phase II relied on end user participant feedback.

The GMU Immersion team conducted LATIST prototype Round 1, Phases I and II usability testing to establish a baseline of user performance, to establish and validate user

performance measures, and to identify potential design concerns to be addressed in order to improve the efficiency, productivity, and end-user satisfaction.

Usability test objectives for Round 2, Phases I and II were threefold. First, usability testing should help determine design inconsistencies and usability problem areas within the user interface and content areas. Next under controlled test conditions with representative users, assess whether usability goals regarding an effective, efficient, and well-received user interface were achieved. Third, to establish baseline user performance and user-satisfaction levels of the user interface for the final prototype.

Round 1: Phase I

Round 1 testing focused on the first level of Kirkpatrick's evaluation model, the reaction level. This level of evaluation measures participant perceptions and seeks their recommendations for improvement. In Round 1, Phase 1, the GMU Immersion team reviewed the prototype and three GMU faculty provided expert instructional systems designer (ISD) review. The following comments and recommendations were noted:

- LATIST conveyed its intended purpose as a performance support tool
- Remove Decision Aide and Factors Grid from the sidebar and embed in the center of the page
- Reposition overview text box in the Explore Research component
- Organize side navigational menu and the technology quick links so that they have a consistent appearance

After reviewing the initial prototype and taking into account GMU faculty feedback, the GMU Immersion team created a discrepancy report to outline required corrections prior to submitting the prototype to DAU via email. Bean Creative, the vendor contracted to develop the LATIST prototype, addressed the majority of the requested changes presented in that report.

Round 1: Phase II

In Round 1, Phase II, DAU stakeholder-users conducted an asynchronous review of the initial prototype and answered a brief online survey. Survey results were generally positive in regards to the layout, navigation, and overall functionality of the LATIST prototype:

- Menu items in the LATIST prototype were easy to find
- Navigation was intuitive
- Interface was visually pleasing
- Organization of the information was clear.
- Process offered in the Decision Aide was logical and information presented was relevant
- Four of five respondents were satisfied with how easy it was to use the LATIST prototype.

Suggestions for improvement included:

- Complete the Decision Aide in order to fully judge its usefulness
- Enlarge graphic in Decision Aide
- Use a larger font on the final page
- Illuminate gray horizontal sub-tabs in the Explore Research component for clarity

These concerns were addressed prior to Round 2 testing.

Round 2: Phase I

Round 2 testing yielded additional information at the Kirkpatrick reaction level of evaluation, but initial results at the Kirkpatrick learning level of evaluation were gathered as well. Participants' ability to begin to navigate and make connections among the three components of the tool indicates preliminary alignment of user behavior with objectives. Round 2, Phase I was an expert review of the initial evaluation between the developer, Bean Creative, two members of the GMU Faculty, and the GMU Immersion team. The GMU Immersion team created a criticality report to outline required corrections prior to submitting the prototype to DAU for Phase II usability testing. Bean Creative addressed the majority of the requested changes presented in that report prior to Round 2, Phase II testing.

Round 2: Phase II

Round 2, Phase II testing took place on DAU's main campus at Fort Belvoir. Nine participants selected by DAU received a brief overview on LATIST prior to the usability test. Once the test began, participants evaluated LATIST within their own workspace on a web browser organic to their computer. A GMU Immersion team member observing the test guided the participants to the LATIST site. Participants were encouraged to think-aloud as they used LATIST while completing scenarios provided for the test. Their thoughts were captured using a tape recorder; in some cases supplementary notes were taken.

The GMU Immersion team used a method of problem severity classification to evaluate and analyze data gleaned from the phase II usability tests. This approach treats problem severity as a combination of two factors - the impact of the problem and the frequency of users experiencing the problem during the evaluation. Survey results were synthesized for each question. Common themes per questions were tabulated and the results were analyzed to identify potential changes to LATIST. Based upon these results, a list of modifications and fixes were submitted to the developer for the next iteration of LATIST.

Summary of Completion Rate and Error-free Rate

The following tables summarize areas of success and areas for enhancement based on the completion rate and error free rate measurements:

Component	*Area*
Explore Research	Participants located general information about the specific technologies i.e. definitions, best practices, advantages, disadvantages, and recent reports
Select Best Technology	Participants navigated through the factors grid and located technologies that worked given specific constraints i.e. budget
Select Best Technology	Participants located recommended technologies based upon a specified learning objective
Apply	Participants successfully located the real-world examples tab to determine how a given technology is being used in other government agencies
Apply	Specific examples of the various technologies were located by the participants
Global	Participants were able to navigate across the multiple components of the LATIST prototype

Table 3. Usability testing areas of success

Component	*Area*
Explore Research	Participants had difficulty locating the summary report, which displays all relevant information regarding a specific technology.
Select Best Technology	Participants had difficultly navigating from the factors grid to the decision aide.
Apply	Participants had difficulty locating the area of the tool that directs users where they can practice specific technologies.

Table 4. Usability testing areas for enhancement

Test Completion Time

The time it took participants to complete four scenarios may be an indicator of the value on investment for DAU. The average time for completion of the four scenarios was 21 minutes. In that amount of time the participants completed the following:

- Located Literature on blogs
- Located a Printable Summary Report on blogs
- Located a Video on How to Implement blogs into DAU's learning environment
- Located Real World Examples of how blogs are being used in other government sectors
- Located free blogging platforms to afford users the opportunity to create their own blog before trying to use one in their course
- Located Advantages, Disadvantages, and Best Practices of blogs
- Discovered within LATIST, how to appropriately align learning objectives with learning strategies and appropriate technologies
- Discovered within LATIST, how to identify which technologies are best suited for use based on restrictive factors
- Completed a scenario of an individual coming to LATIST to find out what technologies might be best to use while creating a new course with the desire to support a particular learning strategy.

The test concluded with an open-ended question, "What is your overall opinion of LATIST in terms of its value to you?" which produced a variety of responses.

- Overall the tool received positive feedback and many subjects thought the tool would be helpful in raising awareness of technology options among DAU staff.
- In addition, the tool was called a "good idea generator" and many subjects thought that, with further development, LATIST would be a good resource.
- Subjects responded favorably to the tool's use of videos and many suggested that more of these multi-media types of resources be included.
- Subjects indicated a desire for more examples explaining how to integrate technology into learning assets.
- Many subjects wanted to share the information in the tool and suggested that easier ways of sharing be included, such as social media links and email options.
- The importance of scalability was mentioned several times and issues of maintainability and information relevance were stressed by several subjects.
- A desire for more interactivity between components and between the Decision Aide and the Factors grid were also expressed.

Recommendations

LATIST is an electronic performance support tool designed to allow the user to: (1) explore what the research says about a technology such as advantages and disadvantages; (2) select a best technology for user conditions such as learning objectives and bandwidth constraints; and (3) review and learn how to apply a selected technology. The initial project goal as discussed previously in this document was to identify a process that will effectively integrate technology into DAU learning assets that enhance learning. The tool was conceptualized as research-based framework to assist DAU with the integration of ALT into their learning assets. A usage-centered design approach was used to meet the specific needs of all users, regardless of their role in the ALT integration process. The results of these efforts are reflected in the LATIST prototype. In order to ensure the prototype aligned with the client needs and expectations, the GMU Immersion team conducted two rounds of usability testing on LATIST

The results of the usability testing indicated the prototype received positive feedback and many participants thought the tool would be helpful in raising awareness of technology options among DAU staff. In addition, the tool was called a “good idea generator” and many participants thought that, with further development, LATIST would be a good resource. Subjects responded favorably to the tool’s use of videos and many suggested that more of these multi-media types of resources be included. Participants indicated a desire for more examples explaining how to integrate technology into learning assets. Many participants wanted to share the information in the tool and suggested easier ways of to do so, such as social media links and email options. The importance of scalability was mentioned several times and issues of maintainability and information relevance were stressed by several. A desire for more interactivity between components and between the Decision Aide and the Factors Grid were also expressed. While the results of the usability testing on the prototype appear favorable, the results are based on a limited capability due to the minimal content and functionality available in the prototype.

Based on comments recorded throughout the usability testing of LATIST, the GMU Immersion team makes these further recommendations to assist DAU with the continued development of LATIST:

1) Implementation Recommendations:

- Migrate LATIST prototype from Bean Creative servers to DAU servers
- Continue to develop more content to give the prototype a robust capability
- Conduct subsequent rounds of usability testing in order to gauge the effectiveness and efficiency of the support tool
- Conduct further testing with a greater diversified audience to verify functionality and usability of the tool. Develop a content update and maintenance plan to support relevancy and currency.
- Build out the definition, help, and advanced search functions

- Develop login functionality so that users may rate, share, and upload resources, take notes, mark favorites, and subscribe to an RSS feed

2) Enhancement Recommendations:

- For the Select Best Technology:
  - Enhance the Decision Aide so a user can enter a specific technology and the system will output all recommended instructional strategies and corresponding learning levels
  - Combine the Decision Aide and Factors Grid. Technology selected from the Factors Grid should carry over to the Decision Aide, and vice-versa.
  - Add definitions to terminology in the Factors Grid as well as in the Dictionary.
- Explore Research:
  - All cited references should link to the article (or to the DAU library portal to access the journal articles)
  - Develop an Amazon-style ‘recommended reading’ feature based on prior user selections

DAU stakeholders indicated in usability testing that a well-organized and comprehensive performance support tool is highly valued by DAU. Implementing the aforementioned recommendations and continuing to work with users will ensure the continued development of a user-centered performance support tool to help DAU faculty and staff pedagogically integrate appropriate technology into their learning assets.

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Appendix A: Sample Scenario and Use Case

Mary Jane, a course manager, received a mandate from her supervisor to incorporate wikis into one of her courses. Mary Jane is not knowledgeable about wikis so she decides to use LATIST to learn more about them. She starts with the Explore Research component because that area provides extensive research about all technologies. She starts by viewing an overview of wiki technology. After reading that, she decides she wants to know about how to incorporate wikis into the classroom environment. She finds an article that says how effective wikis were for George Mason University (GMU). The article includes a link to the GMU website that contains more information. She visits the GMU website and learns more about this example implementation. Mary Jane really found this article useful so she marks it as a favorite for individual reference but she also rates it highly so others will know that this article is worth reading. Now she wants to explore how other academic environments have used wikis. After skimming a couple of articles, she is convinced a wiki could be used effectively in one of her courses. Mary Jane will need to understand what the best practices are for this technology. She also reviews the table of advantages and disadvantages. With an understanding of best practices, she's ready to see a demo. After reviewing a demo, she decides to print the best practices, advantages, and disadvantages for easy reference while she's reviewing her course plan to identify areas where a wiki would be most beneficial.

These desires and system responses were expanded to better represent specific user actions with the corresponding system responses as shown in Table 1.

Course Manager Integrates Mandated Technology - Use Case

User Action	System Response
Enter Explore Research	Display options: EDUCAUSE, Best Practices, Advantages / Disadvantages, Research, Personal
Choose EDUCAUSE	Displays technology types
Enters technology (wiki)	Displays article
Reads article Closes article	 Closes article
Return to choose another option	Displays options: EDUCAUSE, Best Practices, Advantages /

	Disadvantages, Research
Choose Research	Displays data fields to filter articles
Enters data fields (wiki case history)	Displays filtered articles
Selects one article	Displays article
Reads article Activates link to external website	Displays external website in new window
Reads external website article Closes external website	External website window closes
Closes article	Close article
Marks article as personal favorite	Marks and retains list of favorite articles
Rates article highly	Tracks and visually presents article rating
Selects another article	Displays article
Reads article Closes article	Closes article
Return to choose another option	Displays options: EDUCAUSE, …
Choose Best Practices	Displays Best Practices
Reads best practices Prints best practices	Prints best practices

Closes best practices	Closes best practices
Return to choose another option	Displays options: EDUCAUSE, …
Choose Advantages and Disadvantages	Displays Adv/Disadv
Reads Adv/Disadv Prints Adv/Disadv Closes Adv/Disadv	 Prints Adv/Disadv Closes Adv/Disadv
Return to choose another option	Displays options: EDUCAUSE, …
Choose Demo Component	Displays transfer options (e.g., enter wiki is the technology?)
Exit Explore Research	Goes to a main menu to select Explore Research, Select, or Demo
Exit LATIST	Closes LATIST

Appendix B: Decision Aide Data

Note: All associated data is subject to change and needs to be updatable.

Level	Level Objectives	Example Objectives	Instructional Strategy	Instructional Strategy Definition	Technology	Technology Definition
Remembering and Understanding	Exhibit memory and demonstrate understanding of facts and ideas. (define, repeat, explain, discuss)	Example 1: From ACQ 201A Module 2.6: Given programming and budgeting documents, relate the applicable funding policies to each of the six DoD appropriation categories of greatest interest to acquisition programs Example 2: From ACQ 201A Module 2.3: Identify the four steps of the risk management process model	Presentation / Lecture	In presentation / lecture, a speech is read or delivered before an audience or class, especially for instruction or to set forth some subject.	podcast, vodcast	A podcast is an audio media file available for download from the internet or to subscribers through a syndication feed which can be played at a later point in time on any device capable of playing MP3 files.
			Questioning	Provide students with questions that will test understanding of concepts and facts.	Instructor lead - however the instructor can use technology tools and software for prompts such as Word, PowerPoint, Articulate	
			Examples	Ideas or objects drawn from a group of ideas or objects to represent core features of the group from which they are drawn.	Learning Management Systems	A learning management system (commonly abbreviated as LMS) is a software application for the administration, documentation, tracking, and reporting of training programs, classroom and online events, e-learning programs, and training content
			Practice	In learning cognitive skills, repeated exposure to concepts through practice increases the probability that the student will remember.	games, simulation	Simple, easy to play, short games. Casual games are simple to learn, inexpensive to build and have a short playing time.

Level	Level Objectives	Example Objectives	Instructional Strategy	Instructional Strategy Definition	Technology	Technology Definition
Apply and Analyze	Apply knowledge of facts, concepts, and principles to new situations. (practice, demonstrate, compare, analyze)	Example 1: From ACQ201B Module 3.4: The student will be able to analyze technical data to identify risks and ensure a system will be operationally effective and suitable. Example 2: From ACQ201A Module 4.2: Apply one or more selected qualitative tools (e.g., fishbone diagram) to resolve a problems	Problem solving	Problem-solving activities place more emphasis on learning how to learn, rather than specific content. In problem-solving activities, the process of problem solving becomes more important, such as the learner's ability to form a hypothesis, find and sort information, think critically about information, ask questions, and reach a resolution or solution.	augmented reality	Virtual data such as text, pictures, and video is combined with what we see in the real world, for the purpose of enhancing the information we can perceive with our senses.
			Role-play activities	Role-playing allows learners to bring their own experiences into the role-playing situation and consequently gain "ownership" of the learning process. Often the learning environment is fictitious or metaphorical but also engaging so it captivates the learner's attention. Role-playing strategies encourage students to gain the accompanying knowledge and skills in order to survive in their "role" within the learning environment. Skills could include communication and interpersonal, key to effective participation in an online learning environment.	simulation, virtual world, game	Virtual Worlds allow manipulation of both time and space; slowing or speeding time; viewing microscopic as macroscopic and vice versa. Mistakes can be made without penalty or consequence as in the real world.
			Articulation	Articulation involves students making tacit knowledge explicit by explaining to others what they know. As students articulate their knowledge to one another, they share multiple perspectives and generalize their knowledge so that it is applicable in different contexts.	blogs, microblogging	Blogs (or weblogs) are an online, chronological collection of personal commentary and links that serve to capture thoughts and comments on a public website for others to read and respond to. A blog is frequently updated with entries arranged in reverse chronological order. Entries can include text, hyperlinks, images, or multimedia. Visitors can read postings, submit comments, find entries by date and by keyword.

Level	Level Objectives	Example Objectives	Instructional Strategy	Instructional Strategy Definition	Technology	Technology Definition
Evaluate and Create	Propose alternative solutions and make judgments about ideas. (plan, design, assess, estimate)	Example 1 From ACQ201B Module 2.1: The student will be able to modify, present, and defend an acquisition strategy to accommodate a change in program funding levels Example 2 From ACQ201B Module 1.3: The student will be able to evaluate alternative approaches to meet a requirement based on affordability, schedule, and technical considerations	Reflections	Reflection involves students reviewing what they have done, analyzing their performance, and comparing it to that of experts and peers.	Blogs	Blogs (or weblogs) are an online, chronological collection of personal commentary and links that serve to capture thoughts and comments on a public website for others to read and respond to. A blog is frequently updated with entries arranged in reverse chronological order. Entries can include text, hyperlinks, images, or multimedia. Visitors can read postings, submit comments, find entries by date and by keyword.
			Hypothesis generation	Hypothesis generation is a learning strategy in which learners acquire concepts by setting forth tentative hypotheses about the attributes that seem to define a concept and then testing specific instances against these hypotheses. Testing and exploration offer learners an opportunity to refine their hypotheses.	game, virtual world	A strategy game provides players the opportunity to test their skills and theories in a digital play environment with competitive activities to test out hypotheses and win.
			Case study	Case studies are real life problems that have arisen in the workplace that students must solve. Can also be used to explore interpersonal relationships.	simulations, videos	A simulation is a computer generated model that imitates a real-life scenario with variables and options.
			Collaboration	In collaboration and social negotiation, the goal is to share different viewpoints and ideas and to collaborate on problem-solving and knowledge building activities. Groups are formed to provide variation in classroom activity (face-to-face or virtual), share workloads (permitting larger projects), and promote peer tutoring.	wikis, social network	Wikis are editable websites where any user can edit, add, or read content to that particular website. Their structure and content, be it text pictures, or other content format can be changed readily. Wikis support collaboration, problem solving, critical thinking and may also motivate students.

Appendix C: LATIST Design Requirements

The design requirements for LATIST are described from both a system and user perspective.

LATIST System Requirements

The LATIST tool will be implemented utilizing a WordPress platform with MySQL as the database. Also the LATIST system must effectively work with Internet Explorer versions 7.0 and above in a Windows 2003 .Net Framework. Additionally, the system should be built cognizant of Section 508 requirements, however full 508 compliance can be incorporated after the prototype has been approved by DAU. DAU prefers SQLServer 2005 but will accept MySQL.

When designing the LATIST system there are several considerations which must be accounted for in the working prototype. These include:

- DAU logo (Link for instructions: http://www.dau.mil/pubscats/Pages/MediaKit.aspx)
- GMU logo (Link for instructions: http://logo.gmu.edu/webguide/)
- Users must be able to access the desired information or component within three clicks.
- Download and navigation response time should be as fast as possible, with a goal not to exceed 10 seconds for downloads. (Note: This assumes high speed internet)
- The development platform consisting of hardware and software requirements will conform to DAU standards.
- Design factors must include use of the tool on mobile devices.
- LATIST will support multiple navigation points. Users can navigate and search by component or by technology.
- LATIST will be linked to DAU.mil and should follow the www.dau.mil color schemes.
- Screen Resolution for PC's and mobile devices must meet standards for maximum usability.

LATIST User Requirements

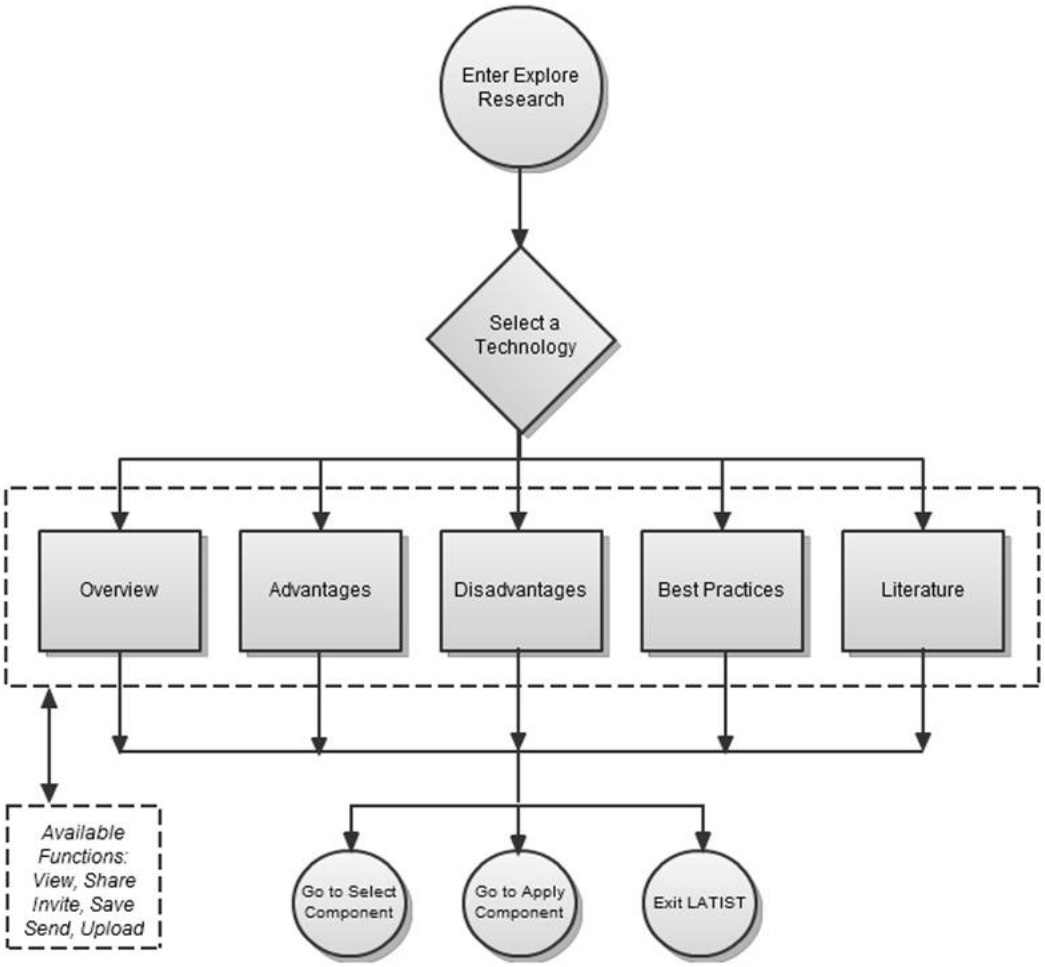
This section summarizes the user requirements, flowchart, and wireframe for LATIST from a global perspective. The following table lists and describes the features and functionalities available to the users.

Print	The user shall be able to: • print documents in their native format • print screen in a print friendly version • print text versions of all audio
Save	The user shall be able to save: • information in its native format to a user specified location • a report • a webpage • a media file
Navigate	The user shall be able to seamlessly navigate to any component within LATIST.
Search	The user shall be able to: • search across LATIST • search by keyword
Dictionary	The user shall be able to : • Interactively search for term definitions related to LATIST and technologies
Login	The user shall login in to modify LATIST content: • to upload, take notes, mark as favorite, rate, view favorites, save
Help	The user shall be able to request help for technical issues.

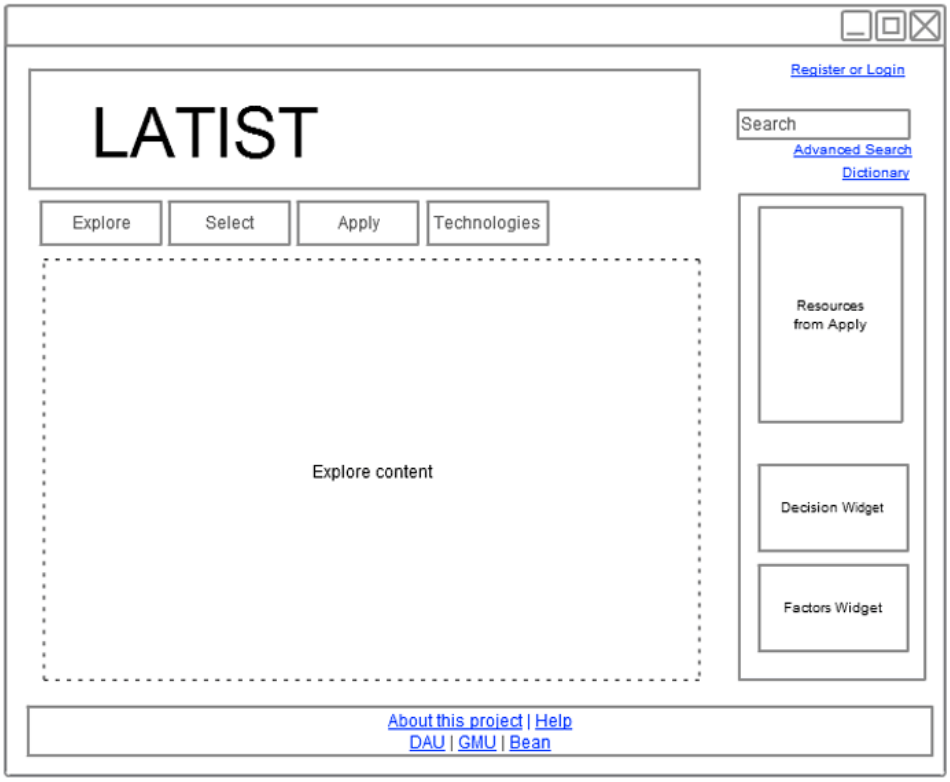
Appendix D: Explore Research Component User Requirements and Flowchart

Explore Research Flowchart

The primary navigation for LATIST will be by component (Explore Research, Select Best Technology, Apply Technology) while a secondary navigation by technology will be supported (Technology quick links). Having selected Explore Research from the primary navigation, the user selects a technology to research. Once a technology is selected, the user is presented with an overview of that technology. The user will be able to select to review advantages, disadvantages, best practices, and literature on that technology. After the user has selected a technology and reviewed the provided research-based information, the user can move to another component based on that technology. For example the user can seamlessly navigate to the Apply Technology component (tutorial or practice) with the technology already selected. These relationships are indicated in the flowchart.



Explore Research Flowchart



Explore Research Home Page

Explore Research User Requirements

The following outlines the requirements for the prototype. Each requirement is noted as 'must have,' mock-up, or later development; 'must have' items are intended to be programmed; mock-up items need only have the appearance of functionality; and later development items do not need to be addressed unless it impacts the required and mock-up functionality.

While in the Explore Research component, the user shall be able to navigate to any other Explore Research subcomponent or the Select Best Technology component or the Apply Technology component or exit LATIST. The user should be able to add, upload, search, take notes, rate resources, mark as favorite, print, and subscribe/receive RSS feeds, and print. Note that a*ny modification to LATIST content will require user login.* These functionalities are defined below.

- Add: The user shall be able to add content to the advantages, disadvantages, and best practices tables. (mock-up)
- Search: The user shall be able to search for resources across LATIST by author, date, title, technology, sub-technology, keyword, rating, and marked as personal favorites. (must have)

- Search Results – The search results include the author, date, title, average rating, access the full citation, link to the resource, link to the user's personal notes associated with the resource and if the user has previously marked the resource as a favorite. The user shall be able to sort search results by author, date, and rating. Note that not all fields may be populated for all resources. The user shall be able to view / read selected resource in its native format (pdf, excel, wmv, etc).

- Upload: The user shall be able to upload resources and provide database elements (author, date, title, author, rate, file name; see data element model). Add a check box reflecting user has reviewed copyright permission.

- Notes: The user shall be able to create personal notes for each resource and as independent files. The notes can be edited, saved, and printed.

- Rate: The user shall be able to enter a rating for any resource; an average for all users will be displayed visually with an iconic rating of 1 – 4.

- Mark as Favorite: The user shall be able to mark as favorite any resource from the search results list.

- Review Favorites: The user shall be able to view their list of personal favorites. The list can be presented similar to the search results and with the same functionality.

- Print: The user shall be able to print resources in its native format and print screen in printer friendly format, such as the results from the search function.

- RSS Feeds: The user shall be able to subscribe to and receive RSS feeds. An RSS will be developed that notifies users to resources uploaded to LATIST.

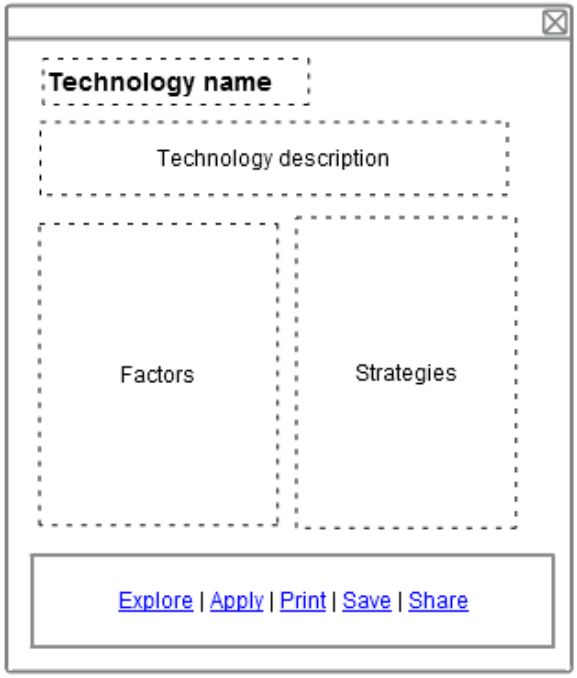
- Save: The user shall be able to save selected resources to a user specified location.

- Recommended Reading: The user shall be able to view a recommended reading list based on prior resource selection.

Appendix E: Select Best Technology Component User Requirements and Flowchart

Generate report: Through both the Decision Aide and the Factors Grid, users shall be able to generate a report about a specific technology. This report will include:

- Short description of technology
- List of strategies supported by technology
- Factors mapped to technology
- Links to technology sections of Explore Research and Apply Technology components
- Links to print, save, and share



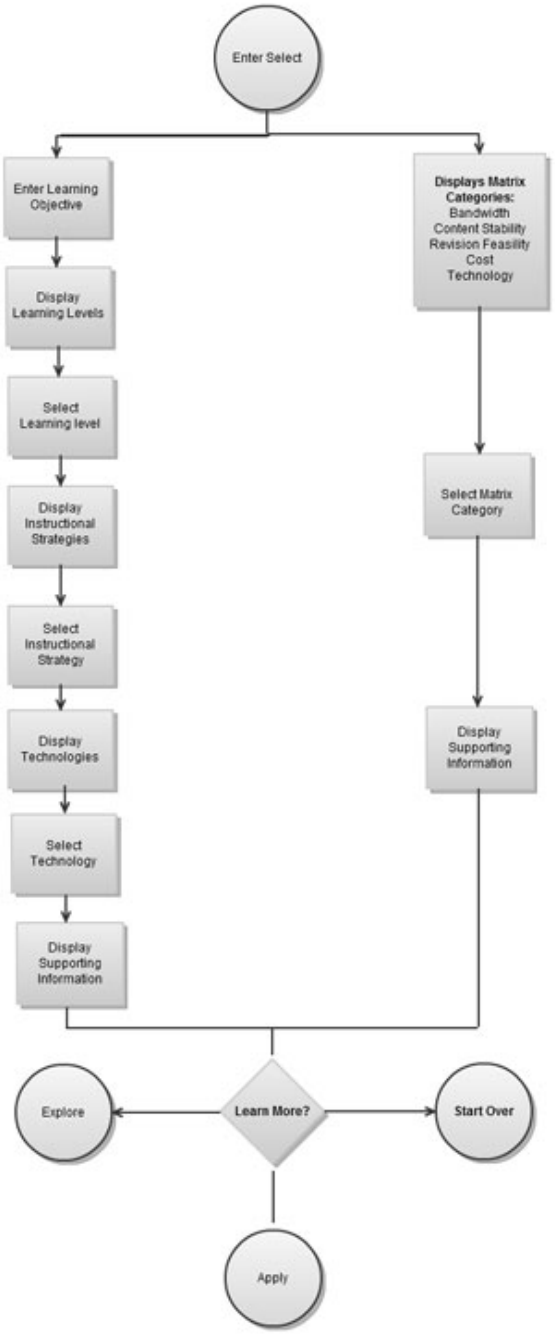
Print report: The user shall be able to print the report in a print-friendly format.

Save report: The user shall be able to save the report to a user specified location.

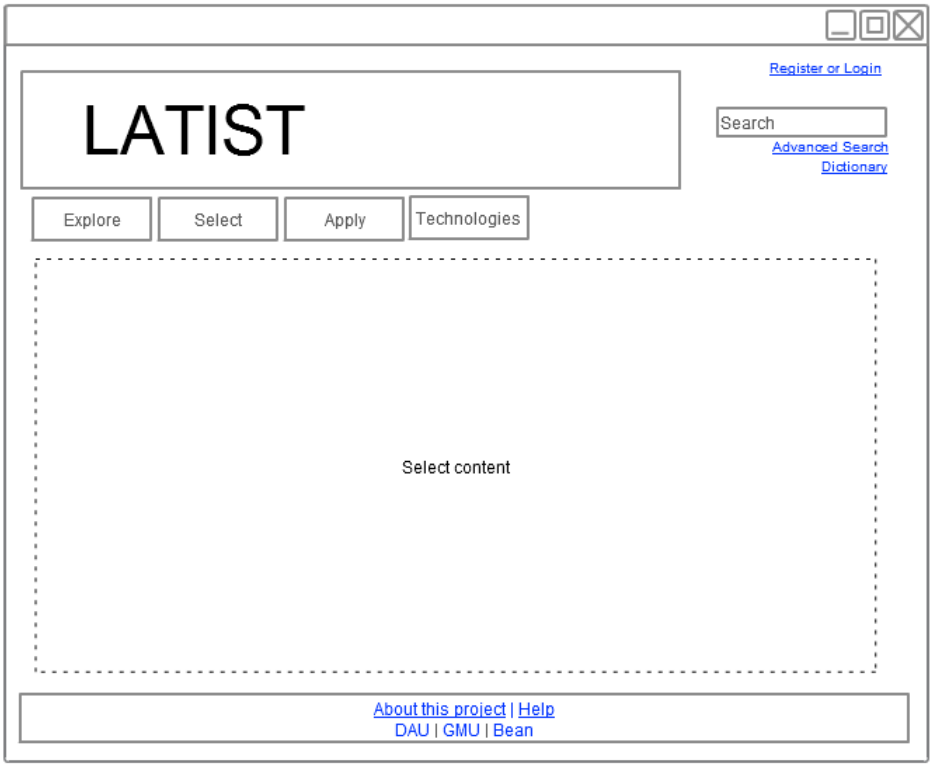
Share report: The user shall be able to share the report through email.

Browse factors: The user shall be able to browse information in the factors matrix by technology or by factor.

Navigate: The user shall be able to navigate to the other components of LATIST that are related to a specific technology.



Select Best Technology Flowchart



Select Best Technology Home Page

Appendix F: Apply Technology Component User Requirements and Flowchart

Apply Technology Flowchart

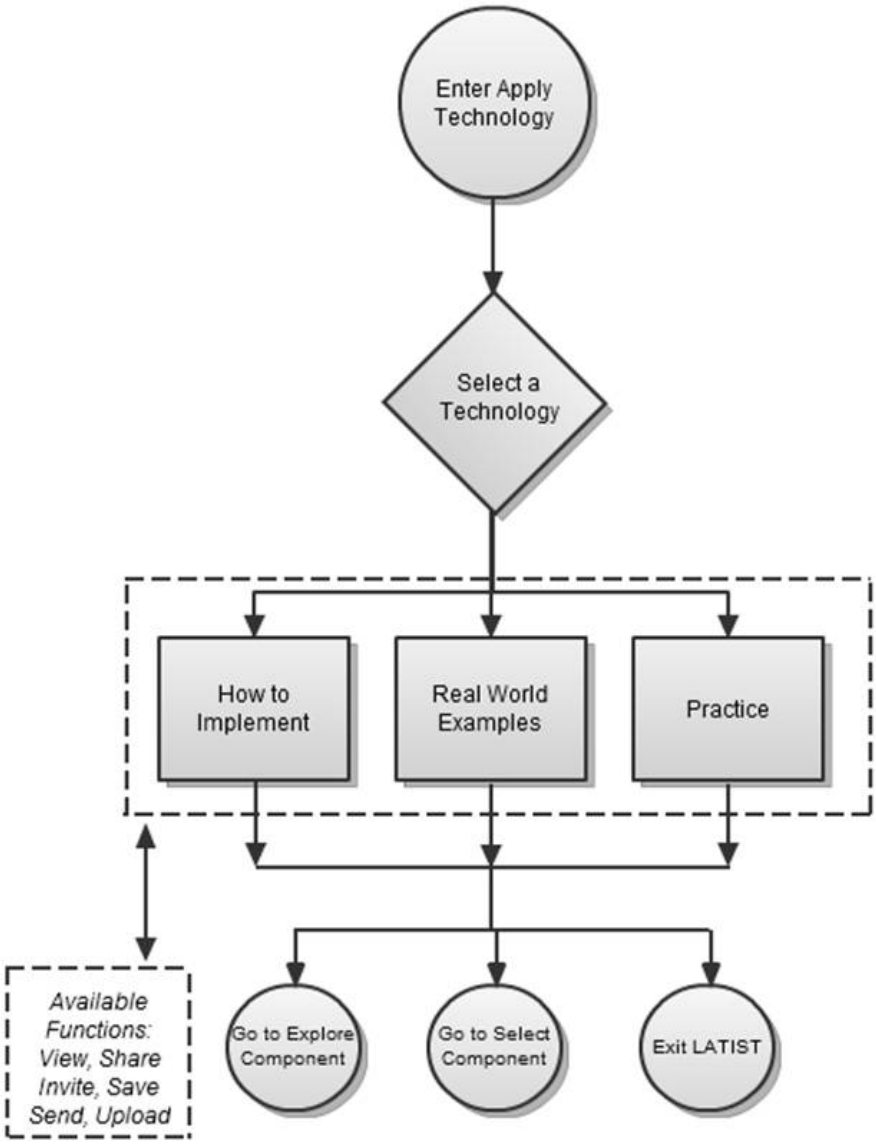
The primary navigation for LATIST will be by component (Explore Research, Select Best Technology, Apply Technology) while a secondary navigation by technology will be supported (Technology quick links). Having selected Apply from the primary navigation, the following describes the layout of the Apply Technology component. Navigation within the Apply Technology component will be by the technology classes: 1) Social Media, 2) Mobile Technology, and 3) Virtual Worlds/Games and Simulation. Each technology class will have specific technologies listed within that category. Each technology will have the following functions:

- How to implement subcomponent: In this area, the user could read, view or link to an explanation of how to implement a specific technology contextualized to DAU content. The subcomponent will contain Flash/video/text/text document/URL files as required to access the how to develop explanation.

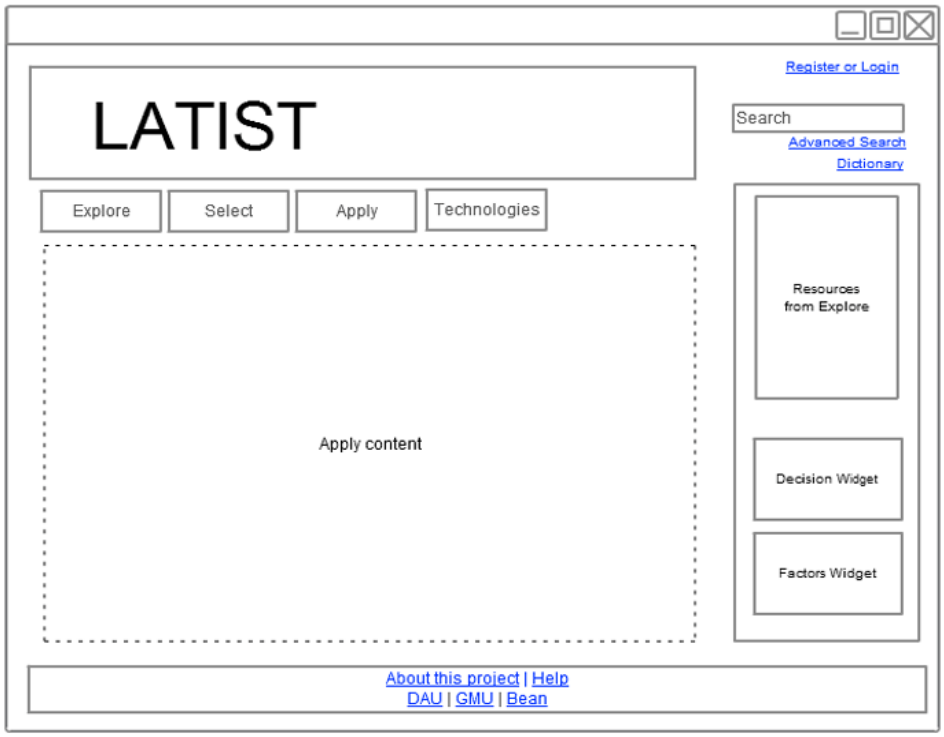
- Real world examples subcomponent: In this area the user will be provided with a URL to an external website which will allow them to get an opportunity to see how a specific technology is being used in a real world context as well as contextualized to DAU content.

- Practice subcomponent: This area will provide the user a URL to an external website which will allow them to get an opportunity to experiment using a specific technology.

These relationships are indicated in the flowchart below. The basic wireframe developed for the Apply Technology component based on the flowchart is also provided.



Apply Flowchart



Apply Technology Basic Wireframe

Apply User Requirements

The following outlines the requirements for the prototype. Each requirement is noted as 'must have,' mock-up, or later development; required items are intended to be programmed; mock-up items need only have the appearance of functionality; and later development items do not need to be addressed unless it impacts the 'must have' and mock-up functionality.

While in the Apply Technology component, the user shall be able to navigate to any other Apply subcomponent or the Select Best Technology component or the Explore Research component or exit LATIST. The user should be able to add, upload, search, print, send, and login. Note that a*ny modification to LATIST content will require user login.* These functionalities are defined below. Note: not all functionalities are represented in the prototype.

- Add: The users shall be able to add content to any of the subcomponents within the Apply Technology component.
- Search: The user shall be able to search for resources across LATIST by author, date, title, technology, sub-technology, keyword, rating, and marked as personal favorites.

- Upload: The users shall be able to upload resources and provide database elements (author, date, title, author, rate, file name; see data element model).
- Print: The users shall be able to print resources in its native format and print screen in printer friendly format, such as the results from the search function.
- Save: The users shall be able to save selected resources to a user specified location, in any specified format and file type.
- Navigate: The users shall be able to navigate anywhere within LATIST within 3 clicks or less; users shall be able to seamlessly navigate to subcomponents within the Apply Technology component as well as to related content within other components/subcomponents.
- Send: The users shall be able to send from the Apply Technology component. Users will need the ability to send media files, emails, and links to pages and print friendly versions of text from the Apply Technology component.
- Open Content: The users shall be able to easily open all content in the Apply Technology component. Users shall be able to open all content using double right clicks in standard windows format with the option of opening material in a separate window.
- Login: The users shall be able to login prior to adding or uploading content into the Apply. Users will be able to login using an ID and password, through creating an ID and password for the first time, and shall be able to access all secure elements of LATIST once logged in.